

**NSF Committee of Visitors Report
Deep Earth Processes Section
Division of Earth Sciences
Directorate for Geosciences
June 9-11, 2008**

2010 RESPONSE TO SPECIFIC COMMENTS IN THE COV REPORT

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On June 9-11, 2008, a Committee of Visitors (COV) met at NSF to review five Programs in the Deep Earth Processes Section (DEP) of the Division of Earth Sciences (EAR). These Programs included: *Tectonics, Petrology and Geochemistry, Geophysics, Continental Dynamics, and EarthScope*. The review covered proposal and award actions for the Fiscal Years of 2005, 2006, and 2007. While positive and complimentary of NSF's management of the DEP Section, the COV report contains some specific recommendations on areas that could be improved by the Section. The following sections provide the 2010 update in *italics text* to the specific recommendations contained in the COV report:

1. The committee recognizes that cross-disciplinary research offers exciting opportunities for new and even "transformative" advances. At the same time, some of the most important scientific achievements have come from bright individuals, a situation likely to continue for the foreseeable future. The COV recommends that the DEP programs preserve a healthy fraction of awards to individual-PI projects.

Response: The number of collaborative and interdisciplinary projects submitted to all DEP Programs has increased over the past few years, reflecting the reality that some problems can only be solved using an interdisciplinary approach. We will endeavor to continue to balance the needs of disciplinary and single investigator projects PI's and, at the same time, encourage new partnerships that are formed to investigate Deep Earth questions from a multi- and interdisciplinary perspective.

2010 Update: *DEP program officers continue to pay close attention to the balance between individual-PI and collaborative awards. Special attention has been given in the past year to NSF first-time, early-career, and CAREER awards, especially for 2009 ARRA awards.*

2. We recommend that Program Officers take steps to communicate to their constituent communities the means by which proposers can satisfy the "broader impacts" criterion in their proposals as well as the importance that this criterion will play in proposal evaluation and award decisions.

Response: NSF has an excellent website that describes examples of broader impacts appropriate for use in proposals (<http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>). We agree that NSF Program Officers should make a greater effort of educating the reviewer community and the

review panels, as well as PIs, to ensure that proposals are evaluated and assessed in a consistent manner for their strengths and weaknesses in the broader impacts criteria.

2010 Update: DEP program officers continue to emphasize broader impacts in their communications with the reviewer community in person to person communications and at meetings. Ad hoc reviewers are required to address broader impacts. Program officers in panel meetings specifically request that discussion of broader impacts be meaningfully addressed. Broader impacts must be specifically addressed in the program officer's review analysis.

3. We recommend that the combined use of external mail and panel reviews be continued.

Response: EAR agrees that the combination of mail and panel reviews of a proposal is the most effective and thorough process of peer review. Although more time consuming for Program Officers, this merit review practice is greatly endorsed by the DEP community. Based on feedback from members of the earth sciences community, the recommendations of previous COV's, and the recommendations of this COV report, the DEP Section remains committed to the combined use of external (*ad hoc*) and panel reviews.

2010 Update: The DEP section programs continue to use both external ad hoc and panel review for normal proposal evaluation unless special circumstances, such as ARRA last-minute funding, require a more expedited process.

4. The COV was encouraged to hear that the Petrology and Geochemistry Program has recently reduced the number of requested mail reviews and at the same time increased the rate of return on those requests (to approximately 70%), in large part by means of follow-on requests from the Program Officer that stress the importance of each particular review. The COV recommends that this practice be emulated by the other programs, and that all programs continue to stress the importance of substantive commentary as a critically needed component of all mail reviews.

Response: This is an excellent recommendation, but we note that this approach is common to several Programs within the DEP Section that have broadly similar reviewer return rates. However reviewer return rates are highly variable and reflect the fact that some PI's and communities have increasingly higher review workloads resulting from requests from more than one Program in EAR and elsewhere within NSF. Accordingly, the Programs in the DEP Section will continue to solicit reviews from qualified researchers from the domestic and international science communities, and will encourage reviewers to provide substantive commentary in their assessments of the intellectual merit and broader impacts of proposals. We will continue to strive for a good balance between requests and returns of reviews.

2010 Update: The programs, keenly aware of community work loads, continue to monitor and adjust the balance of number of solicited reviews versus review return rate in order to ensure adequate review and fulfill the NSF requirement for at least three reviews.

5. The COV noted a small number of instances where a panel did not appear to take sufficiently seriously the critical comments of an expert mail reviewer on a proposal in a narrow field not well represented among panel members. The panel and Program Officer should pay particular attention to the substantive comments, both positive and negative, of the most expert mail reviewers in such situations and should seek additional advice if expert reviews are mixed.

Response: NSF Program Officers are ultimately responsible for making the final recommendations regarding the fate of proposals. In making these recommendations, they rely on the expert advice from both *ad hoc* reviewers and panelists. These decisions are also driven

by Programmatic factors such as the desire to support a diverse portfolio of investigators (including early-career PI's), institutions, and modes of research. However, Program Officers are not experts in all disciplines and sometimes cannot judge if reviewer criticisms are warranted. In these cases of mixed reviews, the Program Officer may also provide the PI with the opportunity to rebut the reviewer or panel criticisms prior to making a final recommendation.

2010 Update: DEP program officers continue to carefully evaluate review input in order to receive appropriate discipline advice. If insufficient expert advice is not forthcoming or critical issues remain unresolved, program officers will request additional reviews or allow PIs to address unresolved questions.

6. The Program Officers should take steps to inform potential multi-investigator proposers that the thoughtful development of a management plan would not only improve their chances for an award but would also improve the expected outcomes of their project if funded.

Response: This is an excellent suggestion. For large, complex, multi-investigator and interdisciplinary projects, a management plan should be required. EAR will discuss revisions to our current Program solicitations that would encourage such a plan in these types of proposals.

2010 Update: This suggestion is implemented in three of the DEP programs with the largest number of multi-investigator proposals. For the remaining three, it is waiting on the next round of program solicitations.

7. The maturation of the EarthScope Program introduces other pressures as well, including the pressure to focus studies in North America and the pressure to take advantage of EarthScope assets in geophysical networks by supporting projects that utilize those assets. These pressures, likely to be most keenly felt in the Geophysics, Tectonics, and Continental Dynamics Programs, should be acknowledged in budget formulation decisions within EAR and GEO. At the same time, Program Officers in the affected programs should take steps to ensure that the most compelling scientific projects unrelated to EarthScope continue to be supported.

Response: We agree that EAR needs to continue to evaluate and monitor the proper balance in Program funding based on both internal budgetary considerations and input from the scientific community. We will continue to seek input from AC/GEO, National Academy of Sciences committees, and other community organizations as appropriate. A key tenet of all the Programs at NSF is to support the most compelling scientific projects.

2010 Update: EAR continues to monitor the proper balance in Program funding. Several external factors affect those decisions including overall NSF, GEO, and EAR scientific priorities, as well as the substantial extra ARRA funding in fiscal 2009.

8. Despite the overall high quality of the Tectonics Program, the COV identified the small number of CAREER proposals as a potential problem. We recommended that the program identify methods for increasing the number of CAREER proposals submitted as a route to increasing the likelihood that one or more such proposals can be funded over the next three-year period.

Response: All of the Programs within the DEP Section encourage CAREER proposals from our communities. However, as noted in presentations to the COV, early-career PI's in some communities and disciplines have preferred to submit proposals to the standard EAR solicitations, and many have been successful in obtaining funding for their projects via this route.

2010 Update: As a result of program officer encouragement to the scientific community, the number of submitted and funded CAREER proposals have increased in the Tectonics Program in FY 2009 and FY 2010.

9. Although the feedback provided to proposers is already exceptionally strong, the COV recommends that the nonconfidential information contained in the PO review analysis be shared with the PIs to the greatest extent possible.

Response: We agree that this practice is uneven in the Section. The Programs that are currently not taking full advantage of the “PO Comments” function of eJacket to convey non-confidential information contained in the Review Analyses to PI’s will be encouraged to do so.

2010 Update: Program officers continue to be encouraged to utilize the “PO comments” function of eJacket to convey non-confidential information to PIs.

10. The COV notes that the 2005-2007 EarthScope PI pool included a large fraction of researchers who have a long history of involvement in EarthScope Program development. We believe that the program would benefit from a greater diversity of prior program involvement within the PI pool. We suggest that a broadly advertised or clearly articulated statement of the EarthScope Program’s goal of engaging a broader spectrum of Earth Scientists would be helpful in such an expansion of the PI pool.

Response: As noted by the COV, the EarthScope Program is young, but is maturing appropriately. Greater participation by the community is already occurring as more data become available and the focus of EarthScope expands eastward across the continent.

2010 Update: The EarthScope science solicitation, which is revised each year, incorporates an invitation to a broader spectrum of Earth scientists. Also, the EarthScope program supported a major science and education planning workshop in the Fall of 2009 (the previous science and education planning workshop was held in 2000) with a specific goal of involving a broader spectrum of the community. The resulting science plan is available at www.earthscope.org.

11. The COV noticed some confusion among both mail reviewers and panelists as to what constitutes an appropriate EarthScope proposal. This confusion is a bit baffling to us since the criteria seem well articulated in the program announcement. Because the EarthScope Program is still relatively young, renewed efforts to heighten the understanding of EarthScope’s scientific and educational goals among prospective mail reviewers and panel members would be worthwhile.

Response: We, too, are baffled by this, especially given: the multiple annual Town Hall meetings convened at professional meetings, the high visitorship to the EarthScope booth at the very wide range of meetings where it has been present, the inclusion of EarthScope in the widely distributed *Active Earth* kiosks, the ~1000 recipients of the EarthScope newsletter (4 times annually), the constantly updated website (www.earthscope.org), regular mass emails to the EarthScope (and IRIS and UNAVCO) email lists, etc. However, the Program will continue its efforts to further the understanding of the scientific and educational goals of EarthScope to members of the Earth Sciences community.

2010 Update: The EarthScope solicitation is renewed each year; the EarthScope booth continues at major meetings; the EarthScope newsletter is incorporating more science content; the 2009 workshop described above renews and redefines EarthScope science goals. The resulting science plan is available at the above website.

12. The Continental Dynamics Program mortgages funds at a rate significantly higher than the NSF goal (60-65%). We recommend that efforts be made to decrease the mortgage rate in order to enable funding more new projects each year.

Response: The CD Program funds large, multi-year projects. As with most Programs in the DEP Section, the CD budget has been flat for the past four years. Given these constraints, it is very difficult to have a viable program (i.e., start several new projects each year) without increasing the outyear mortgage. However, the CD Program will make a concerted effort to reduce the mortgage in coming fiscal years.

2010 Update: *The CD mortgage has been reduced substantially in the past two years, partly with the help of 2009 ARRA funding.*

13. In the Continental Dynamics Program, a typical proposal – even after a valuable pre-proposal stage – is submitted two or more times. We therefore recommend that cohort statistics (whereby projects are tracked from the pre-proposal stage through each annual decision cycle) be used to evaluate success rates in addition to annual statistics.

Response: We agree with this recommendation and will implement a program of compiling appropriate cohort statistics in order to evaluate success rates more accurately in the CD Program.

2010 Update: *Cohort statistics for the CD program are being maintained.*

14. Now, with more than 20 years of experience and the exciting EarthScope program underway, we believe that the time is right to review and possibly realign the priorities of the Continental Dynamics Program, including geographic project balance, through a geosciences community workshop.

Response: A Workshop on “Future Research Directions in Continental Dynamics”, attended by over 100 leading researchers in the Earth science community, was held in Chandler, Arizona in March 1989. The output of that Workshop was the report “A National Program for Research in Continental Dynamics CD/2020”. This report provided the scientific roadmap for the CD Program over the last 20 years. It has been widely distributed and translated into a number of languages (including Chinese) and has been a very effective framework document for evaluating CD priorities. We agree that the time is appropriate for another such community workshop to examine both the scope and the future priorities for the Continental Dynamics Program and to update the CD/2020 document.

2010 Update: *A new CD workshop is under discussion.*

15. The Continental Dynamics Program has done an excellent job of supporting large, multidisciplinary, multi-investigator projects that have led to a deeper understanding of the continental crust and lithosphere. The current review system involving both preliminary proposals and full proposals is very thorough. We recommend better documentation, however, of the post-panel discussions between the Program Officer and the PIs, which are an important part of administering complex, multi-institutional proposals.

Response: The Program Officer often has extensive discussions (many phone calls) with the PI's of large CD projects regarding budget issues, project logistics, instrument availability, ship time (if applicable), etc. We will endeavor to make better use of the 'Diary Notes' feature in eJacket to capture the important points in this dialog, as well as uploading the results of electronic

communications with PI's in order to assure that there is proper documentation of Program decisions and oversight.

2010 Update: This suggestion continues to be implemented.

16. Common to all multidisciplinary programs, we encourage NSF to develop criteria by which to assess the extent to which the funding of multidisciplinary projects yields results or insight that exceed those that would come from funding an equivalent set of individual disciplinary projects.

Response: Some of the NSF cross-disciplinary activities have been evaluated professionally in the past. However, there are no accepted criteria for successful outcomes of multi-disciplinary activities that can be broadly applied and evaluated. Because of the complexity and significance of this issue, NSF has released a new Program solicitation in the Social, Behavioral and Economic Sciences (SBE) Directorate entitled "Science of Science and Innovation Policy" (SciSIP). Projects funded under this solicitation will have as one of their goals to develop "quantitative measures or indicators that provide summary information on the size, scope, quality, and impact of science and engineering activities, with particular focus on inputs and outputs of the science, technology and innovation system." This is a new area of social sciences research that will inform how we assess these multidisciplinary projects.

2010 Update: NSF and the NSB are continually evaluating the review process and criteria. Changes to policy are made each year in the Grant Proposal Guide.

17. NSF is encouraged to modify the FastLane review template to include a line item encouraging comments on specific aspects of the budget.

Response: Currently, the Fastlane review template does not include a specific question about the budget and its allocation with regard to assessing intellectual merit or broader impacts of proposed projects. However, reviewers are asked to comment on "project resources" and whether they are sufficient to complete the project. Moreover, it is not uncommon for reviewers and panelists to comment on budgetary issues that are not well justified by the proposed activities. More detailed evaluation of budgetary items is generally deemed to be within the purview of the Program Officers and, if the issue is raised in the review process, they are in a position to make recommendations to the PI's about changing the budget to have it fall in line with the activities to be supported by NSF.

2010 Update: Reviewers have encouragement and opportunity to comment on proposal budgets, and they frequently do.

18. Although the choice of meeting date was agreeable to the COV members, the selection of a meeting date in the first half of June meant that Program Officers had to collect background information for the committee at a busy time in the proposal review cycle. A meeting time in August for the next COV for this Section would permit the Program Officers to devote more time to the COV process.

Response: This is a good suggestion. This recommendation will be forwarded to those in the GEO Directorate who schedule the COV meetings.

2010 Update: This suggestion has been forwarded to the GEO Directorate.

We would like to thank Dr. Solomon and the members of the COV for their time and efforts in making these excellent recommendations that will improve the Programs of the Deep Earth Processes Section.

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